

SYLLABUS IN
SOPHMORE PSYCHOLOGY
Part I
Norman Smith

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STUDENTS' SYLLABUS

IN

SOPHOMORE PSYCHOLOGY

BASED ON

James' "Psychology"

AND


Thorndyke's "Elements of Psychology"

PART I.

LECTURES BY

PROF. NORMAN SMITH

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PSYCHOLOGY LECTURES.

PROF. NORMAN SMITH.

LECTURE I.

Psychology belongs to the first main group of science, the philosophical or mental and not to the second group which is composed of material sciences as mathematics or chemistry. There are only five philosophical sciences—Psychology, Logic, Ethics, Aesthetics and Metaphysics. Logic seeks to determine nature of Truth and ways to attain it; Ethics, the nature of the moral ideal, and Aesthetics, the nature of the beautiful. Psychology determines the nature of mental life taking no consideration of truth or falsity; being as much interested in false beliefs, abnormal or morbid moods as it is in normal mental actions.

The term Psychology comes from a Greek word ($\psiυκ\eta$) (psyche) of wide meaning, denoting the principle of life in every form whether bodily or mental. In English it is usually taken as representing the soul. The suffix ($\lambda\omicron\gamma\omicron\varsigma$) means study or science. This raises the question what is meant by the soul.

All primitive peoples, without exception, distinguish the soul from the body. They all believe in the survival of the soul after death, although some races have lost this idea and recovered it later. Travellers and missionaries report grotesque conceptions of the soul. Within the past 30 years Anthropology has grown in significance and it has cast much light on these beliefs.

Barbarous peoples had to account for the soul in an unscientific manner. They all adopted spontaneously the same underlying view. Two phenomena, *sleep* and *dreams* had much to do with their conceptions. In sleep, a man's consciousness ceases for a time and barbarians say that for a time the man is dead but his soul comes back at his awakening. Dreams are as real to savages as real existence and undistinguishable from it on account of their inability to concentrate attention on them. To work out a realistic interpretation, the savage believes man to have a double existence. While the body of the sleeper lies motionless the soul is away fighting or hunting. Stiffened muscles as a result of the cold, or weariness on awakening are taken as proof that the soul has been exerting itself during sleep and returned tired. These ideas wake up the conception that the soul has a form—is a duplicate in external shape of the body but of material akin to breath and less real than the body. All names for "soul" etymologically are connected with "breath". Death is the final departure of this phantom soul, sleep is the temporary departure. The soul is regarded from a materialistic rather than a spiritual point of view.

Since the primitive man does not understand the true nature of insanity or disease, he explained them by means of the soul. Sickness was thought to be due to the absence of a man's soul, which might be playing truant. J. G. Fraser tells of a sick man who was arrayed in fine clothes by his friends to attract the wandering spirit back and to point out the way, a colored cord was stretched from the bedside to the door of his hut. When sickness is caused by the presence of an alien spirit, small cuts, in which pepper is inserted, are inflicted to injure the spirit and hasten his departure.

Another primitive idea of the soul is its connection with *shadows*. The dark shadow of a man's body and the bright reflection in water are regarded as separate existences. Souls of the dead were spoken of as "shades" by the Greeks and Romans. Many savage tribes believe a man can lose his shadow and so his soul. If a crocodile could seize a man's reflection in the water it could pull him in. The dark shadow is often connected with an after-life existence in a lower world like the Greek Hades while the bright reflection is thought to go to a happy hunting ground or island of the blessed. Two characteristics of the conception of the soul are common to all primitive peoples—

(1) The soul is pictured as having the same outward visible form as the body, capable of uttering sounds and requiring food. Animal sacrifice at burial is a result of this last belief. Russian peasants still use crumbs of bread in ancestor worship.

(2) The soul is conceived as less real than the body as a spectre or phantom. The body is the real man, the soul his shadow or reflection.

This materialistic conception of the soul was held by the Greeks till the time of Plato. At that time the soul began to be regarded as the real centre of existence. Plato was the first thinker to regard

(1) *the soul as purely spiritual* and to teach that it cannot have shape or form and cannot be apprehended by the bodily senses. The only way it can be apprehended is by pure thought. The soul can only reach its highest perfection when separated from the body after death. Plato likened the body to a tool and the soul to its user. Since the soul uses the body it must differ from it, as the tool differs from the worker, and since nothing but the mind uses the body, the mind must be the true self. He taught

(2) *that the soul is higher and more real* than the body and that it exists after death in an exalted and perfected condition.

The Platonic view is called Spiritualism, and is set forth in his Dialogues. In most essentials his view of the soul is still the view of popular and religious thought.

LECTURE II

With the spiritualistic conception of the soul made by Plato, the definition of psychology as the study of the soul would be adequate.

But inasmuch as we modify this spiritualistic conception, we have to alter our definition.

The spiritualistic conception of the soul as taught by Plato cannot be fully accepted. The spiritualists regard the soul in relation to the body as a captain to a ship, and as a rider to his horse. Such analogy is inadequate because the soul cannot exist without the body and is closely related to it. Mind and Body live a common life, and for all our knowledge of material objects we depend on the sensations of the brain which are produced by a material medium. The conscious life is always influenced by the material condition of the body. Fatigue effects the emotions and the will. The soul grows and develops in coincidence with the development of the body. Human and animal intelligence depends on the weight and structure of the brain. Brains of lower races weigh from 1 to 4 ounces less than of civilized peoples. Modern physiôlogy and psychology have disproved that the higher activities of the soul can go on without the body, and have established the law that *every single mental process is accompanied and conditioned by a corresponding action in the brain.*

An extreme view of this physiological law—the *materialistic conception*—denies the distinction between soul and body.

Materialists claim that Mind and Body are identical and both die together. They say that the explanation of a distinct soul is a relic of the primitive dualistic explanation once universal, and that it must finally be displaced by physiology. *This view is as one-sided as the Platonic.* The mind is influenced by the body and it can be shown by measurement that the pulse of a man is quickened at the time of his performing a simple arithmetical problem. The body is tuned to the mind reverberating as a whole and is responsive to every change in conscious experience.

Spiritualism and Materialism as extreme schools are both faulty because they try to make distinct things which are mutually dependent and stand in a causal relation to each other. Spiritualism fails to do justice to the body, Materialism to the mind. A second defect is that the spiritualistic and materialistic views are metaphysical. Modern psychology is empirical—that is it makes no attempt to define the ultimate metaphysical nature of the soul and body; it puts aside questions concerning the destiny of the soul, freedom of the will and confines itself to the concrete phenomena of mental states. (Important.) With this new limitation of separating itself completely from metaphysics *empirical psychology* may be defined as the *science of those mental experiences which come into existence through states of the brain and which react upon the brain.* It is defined as "Psychology without a soul," not necessarily denying the soul but passing over it as of no importance to it.

Representative perception is the manner in which the mind really perceived external material objects. The idea that we see things as

they actually are, is false. *Eyes are not exits.* A material body cannot be apprehended by the brain—only the sensations which it sends out can be apprehended. All objects are invisible and intangible, and the sensations of color or heat or touch which they create in the mind are the results of physical motion, of vibration. We cannot know real objects but only their *representations* in the mind, which are the sensations generated in the brain. Modern psychology is built up on this idea of representative perception and takes as a postulate that there is a self, an ego, behind physical organisms. All mental states are directly connected with brain states.

LECTURE III. THE EXTERNAL WORLD.

The relation of mental to bodily experiences is indirect. The mind controls only the brain and the brain the muscles. The resolution formed in the mind to move an arm acts on the brain which in turn moves the arm muscles.

External objects are apprehended not by a mental duplicate formed in the mind but by a conception of their qualities in the brain. Color and heat and space exist only in the mind. In the material world objects are colorless and without heat. Nothing happens in the physical world except motion. A cannon ball is black only because of the vibrations of ether which it sends to the eye. It is hot or cold because the particles of which it is made up vibrate relatively fast or slow and produce different sensations on the touch sense and through this on the brain. The qualitative difference of the sensation of touch or color is really a quantitative difference of the vibration of the molecules or the waves of ether. In the cannon ball itself there is neither color nor heat. It is only when vibrations pass to the brain through the senses that color and heat are experienced. *Primary qualities* are those qualities perceived alike by sight and touch. They are *extension, figure and motion*. *Secondary qualifications* are modifications of primary qualities and cannot exist outside the *mind*. *Taste, smell, heat, cold, sound,* are examples of secondary qualities. Even the three primary qualities cannot be said to be perfectly perceived, for a drop of water which seems to our senses a continuous mass is in reality made up of a multitude of molecules. The whole sensible world as apprehended by our mental states is an illusion when compared with the results of scientific investigation.

The real external world is a silent uncolored world though strictly that cannot even be said, for these qualities do not exist outside the mind, and silence, therefore, may exist as much as sound and blackness as much as light.

External reality cannot even be imagined at all. Our ideas of it come as the result of representative perception. It can only be de-

scribed in abstract form. The fact that the whole sensible world is only apprehensible by the mind is taken to prove the fallibility of our faculties. If reality is so different from our perceptions of it must we call all our perceptions delusions? Physical science holds that the relation between the mind and objects is a casual relation, and whether color and sound do or do not exist outside the mind, they are realities for us as truly as though they do exist. External nature is merely a mechanism for producing a much more beautiful world within our own minds.

LECTURE IV. THE MIND AND THE BRAIN.

The function of the mind is not to copy the material world as it really is but to create a conception of it. The mind does apprehend somewhat as they actually are, such ideas as motion and figure and space. But *secondary qualities* such as heat, color, taste which are denied to reality, the mind creates. These secondary qualities are subjective and therefore the mind contains a power apart from and greater than all external physical sources. Mind in this way is superior to and richer in quality than matter. Thus the mind or soul which was conceived by the ancients as being less than the body, come to be more real than the body itself.

The value of perception lies not in the scientific exactness of the sensations which it yields but in its apprehension in most convenient form of everything in the observer's environment which is necessary for adequate adaptation to that environment. Everything we experience exists only in the mind. These experiences—everything which we apprehend through the senses—are *mental states*. These mental states have none of the properties of the material bodies which cause them. They have no position in space nor can they be located. Mental states have neither primary or secondary qualities.

The relation of Mental States and Brain States—that is of the ideas in the mind to the process of the brain—is a cause and effect relation. The two kinds of states mutually influence each other. All mental experiences are both effects and causes of the brain processes which accompany them. The brain is as purely material as any other organ of the body and *brain states* or *processes* are nothing but forms of material motion of its particles. Brain states differ from mental states in that the first consists only in material motion, while the second are distinctly immaterial.

Relation of Mental States and Brain States:—Since the brain is altogether material and brain states are nothing but vibrations of its molecules, brain states are of a contrary nature to mental states, which are immaterial. How are these two states related?

The materialist says that the brain "secretes" thought, but this conception makes thought a material, fluid substance, which it is not.

Another materialistic misconception lies in the double meaning of the word "function" in the statement that brain activity is a function of mind activity.

In the physiological meaning the mind is not a function of the brain. In the materialistic meaning, i. e., as one quantity varies the other does also—the brain is a function of the mind. Consciousness and brain activity vary together. The laws of the relation of mental and brain states may be expressed as:

(1) Since mind and brain are opposite in nature neither can be identified with or reduced to the other.

(2) As mental experiences and brain processes vary concomitantly they must have a causal relation.

Psychology cannot explain the interaction of mind and brain because it is a natural science and cannot explain the causal relation. Metaphysics attempts the answer. Psychology clarifies our thinking by defining separately each of the related series of phenomena, and by stating problem in unscientific terms.

LECTURE V. METHODS OF PSYCHOLOGY.

Methods of Psychology:—There are two chief methods through which Psychology is enabled to acquire positive and detailed experiences

I. Direct Method of Introspection.

II. Indirect Method of Introspection:

(a) Comparative Method.

(b) Physiological Method.

The direct method is the observation of each individual of his own experiences or the method of reflection of each man watching what goes on in his own mind. One of the postulates of psychology is that the mind has the power of looking into itself. The direct method is the most important because a man is limited to his own mental state. The mental experiences of others he can never know except as he interprets them in the light of his own mental experience. They are indirectly rendered visible or audible to his senses. We know or perceive only the facial motions of others; their real inner feelings we cannot know.

The artist can make others share his feelings only by painting a picture, writing a poem or composing a sonata. He embodies in his art, his own inner experiences in certain signs and symbols. Psychology is individualistic, for each mind has an inner world of its own opening to only its owner. No two persons can see the same object in the same way. Each mind is like a closed lantern—internally full of light but not directly perceivable to an outside observer. The light which comes through the chinks gives an imperfect idea.

There is no such thing as direct spiritual connection of one mind to

another. However true this may be of connection between God and man as is spoken of in Tennyson's "Higher Pantheism":

"Closer is He than breathing,
Nearer than hands or feet."

it is not so with individuals. A spirit that is not embodied cannot affect our senses.

Direct introspection is difficult, almost impossible. It is one thing to experience an emotion and another to analyze it scientifically. The inner workings of the mind are not clear to us and mental states do not remain uniform or stand still, being in continual change. Emotions wax and wane and before we can observe them, they are already altered. If our mind is filled with joy, when we attempt to analyze it, some of our mental energy which was engaged in being joyous is used up in being reflective.

In the stronger mental phenomena, such as violent emotions, all the mind is monopolized and introspection becomes impossible. These difficulties lead August Kant to deny both the validity of the results of Introspection and the possibility of its processes.

LECTURE VI. INTROSPECTION.

I. *The Direct Method of Introspection* which is the observation by each individual of his own mental states has two shortcomings:

(1) The data of direct introspection are *purely individualistic* and unless the mental experiences of the individual can be compared with the experiences of other observers, we cannot tell whether they are normal or abnormal. Psychology as a science professes to formulate universal laws of the mind, covering all phenomena. The data of introspection must be corrected and supplemented for it lacks generality, is limited in extent and is subjective in character.

(2) The second shortcoming is that *introspection comes late* in the history both of the individual and the race. Children and savages do not reflect; their whole attention is fixed on externals. So there is no psychological record of early mental development or immature states of mind. We are in danger of taking as simple and elemental what is really complex.

II. The Indirect Method of Introspection is divided into two divisions: (a) the comparative method, and (b) the physiological method. In general, the indirect method granting that the one primary condition of successful analysis of any phenomenon is the observation of it under varying conditions, applies this principle to mental phenomena. We must observe the same phenomena in as many varying circumstances as possible. The indirect method is the reverse of the attitude of a novelist or dramatist who deals with psychological studies. It is the attitude of the reader—a work of interpretation. Shakespeare, when he

wrote Hamlet, had one meaning of Hamlet's character in his mind. The modern reader must, on the contrary, interpret for himself the character of Hamlet and the problems of the play according to his emotional or intellectual experience. The jealousy of Othello is an enigma to an unjealous, unimaginative man. What every one does in reading a novel or play must the psychologist do in his interpretation of mental life by the indirect method of introspection.

(a) The *Comparative Method* of indirect introspection has five comparative means of study:

(1) The use psychology makes of mental facts already gathered by men in history, art, biography, literature. Here is a vast amount of material supplied by individual introspection.

(2) The study of child life. No direct investigation of early mental life is possible. The extreme early mental life of the child is lower than that of the higher forms of the animals, but its mental development is very rapid. Psychology would be greatly benefitted if it could know more directly of this initial development.

(3) The study of the mental life of savages or lower races. We can study this in their language, myths, religions. Anthropology is valuable in the comparative study of these manifestations of their mental life. Tylor and Spencer have been the conspicuous investigators in this science.

(4) The study of the mental life in the lower animals. Animal psychology cannot throw as much light on human psychology as animal anatomy has on human anatomy. The difficulty of entering into the mental life of animals is so great that it seems probable the way to further knowledge is by analogy from human mental phenomena. All the fundamental human emotions are to be found in the higher forms of animal life.

(5) The study of defective and abnormal mental phenomena. This study throws light on normal states of mind just as the study of the diseased parts of the body makes clearer its normal functions. This is the method of differences and by it we can often discover causal conditions of mental states. A person suddenly cured of blindness learns the processes of vision which normal persons learn soon after birth. When we see how a mind works which is deprived of one or more of its senses, we can estimate the place of these senses in our own mental life and what make-shifts the intact or sound senses make to fulfil the functions of those wanting. The cases of Miss Laura Bridgman (1829-1889) and of Miss Helen Keller are conspicuous in this respect.

(b) The *Physiological Method* of indirect introspection consists in observation of cases under the influence of anæsthetics, or of opium. The latter seems to cause an increase of space and size in the subject's conceptions, and this sort of data is important in psychological research.

LECTURE VII. KNOWING, WILLING, AND FEELING.

THREE DIVISIONS OF MENTAL PHENOMENA ARE KNOWING, WILLING, FEELING. These terms do not express their exact psychological meaning. Cognition is used for knowing and includes all mental states or concepts, both real and fictitious, actual and possible which represent something, not only the knowledge in the usual meaning of the word. Sensations, images, percepts fall into this class. Feeling is also an ambiguous term. It is often used for the touch (perception) and in that case would be cognition. In psychology it is limited as denoting nothing but pleasure or pain. Willing characterizes the common element in bodily activity, in resolution, determination, restraint. *Conation* is the psychological name of this complex state.

✓ In cognition the mind reconstructs the external world according to the sensations brought to it. ✓ In volition or willing it reacts by bodily movement on the external world. ✓ In feeling it remains within itself and only experiences pleasure or pain. Seeing a flower is cognition, the pleasure from its beauty is feeling the impulse resulting in the bodily action of picking it is volition.

These three kinds of mental experience are not three distinct separate forms but are all involved in every complete mental state. We can classify mental states according to the predominance of one of these elements, but all are present. Even in the pain resulting from the prick of a pin, a case of seemingly pure feeling, the cognition of the sensation as coming from a certain part of the body, and volition also as the cause of the bodily action resulting from the prick, are present. All these three aspects of mental life are inseparable from each other. When one is developed at expense of others, a man is either coldly intellectual, or weakly sentimental, or a slave to environment.

At present there is a tendency among some psychologists to regard the will as more important than cognition or feeling. The will is what bridges the gap between animal consciousness and purely vegetable life. Breathing is necessary for life, and is itself dependent on the will to do so. The error in this view is in regarding breathing as a conscious action but a reflex movement. When we start with a conscious effort we have to recognize that it involves cognition and feeling.

Another school wrongly regards the will not as an ultimate element, but as a complex state resolvable without remainder into cognition or feeling. Then this school would further reduce cognition into feeling and make feeling the one prime element. We find feeling everywhere and as we get back to the lower or more primitive states of consciousness these states become less distinct; the mental feeling of bodily well-being is not a cognition at all,—this school says—but a state of pleasure or pain. If we went down far enough, we would find nothing but states of feeling. This view is not correct. These three forms of

mental states are inseparable and have been coexistent from the dawn of consciousness.

Consciousness:—The problem of the nature of consciousness and its relation to its three forms, knowing, willing, and feeling, is very complex. There is a great difficulty in defining consciousness, because it is so fundamental. We only know consciousness by consciousness.

There are two theories of the nature and condition of consciousness, and psychologists are divided into two schools over this question:

1. The first typical theory is that consciousness is an activity of the mind or self directed upon the mental states as its object. This view involves (1) a mind or self; (2) a particular state or modification of mind itself, and (3) recognition or apprehension by the mind or self of its states. This consciousness is compared to an inner light which the mind casts on its states. This view differentiates the mind from its mental states and makes possible the existence of mental states of which we are not conscious.

2. The second theory is that consciousness is a qualitative mental state sometimes present and sometimes absent, and varying in intensity. This view is taken by the *naturalistic* or *materialistic* school of psychologists. It regards the mind as its being its mental states and holds that there is no right to distinguish between the two. Consciousness is a quality of concrete mental states and self is nothing but the sum of these.

LECTURE VIII. CONSCIOUSNESS (CONTINUED).

Consciousness (Continued). The total sum of consciousness is very wide. One is conscious of a large number of things at the same time, the book one is reading, the walls and contents of the room, the chair, etc. This consciousness varies in intensity. The object on which the attention is fixed is the focus. This focus constantly changes as the attention changes from one object to another.

There are four levels of consciousness which might be represented by the spaces between four circles drawn around the same center. Each of these four levels shades into the one next to it, with no distinct dividing line. The contents of consciousness itself are very indefinite and the point where consciousness changes into unconsciousness cannot be determined. Consciousness is like the light from a candle in a dark room. There may be objects in that room of which we are not aware, and these may represent our unconscious mental states.

Two questions concerning consciousness arise. First. Is the mind always conscious? For hours, as during sleep, all consciousness seems to disappear without affecting the mind and accordingly mind and consciousness must be different. The materialists say that the material brain alone exists during sleep; the spiritualists, who refuse to identify the soul with the brain, are forced to suppose that in deepest sleep the

mind still thinks, or else to distinguish between mind and consciousness. Empirical psychology can give no definite answer. In hypnotic states and dreams persons do certain acts of which they have no remembrance on awakening. There is a chain of memory connecting successive waking states and successive trances, *but not a waking state with a trance state.*

Second Question—Do there exist complete unconscious or sub-conscious states? (*Sub-conscious and unconscious are practically synonymous terms.*) The question really is, Do there exist mental processes and states of which there is no direct consciousness but which seem to prove their existence by leaving effects which are expressed through consciousness? The facts of memory are too many to be contained in consciousness and there is no so called "storing them up in the brain." No experience the mind has passed through is ever fully lost to it. In fever, and drowning all past experiences seem to pass before one's eyes. St. Augustine said that the huge hall of his memory was so vast that he could meet all things that he had ever seen there. These characteristics of memory force the admission that our consciousness is only a small part of our mental existence. There must be a sub-conscious mental activity.

In the sub-conscious reign of the mind processes go on which are identical with the conscious. If we wish to recall a name, we often turn our attention from the search of it to some other matter and presently the name will often push itself into consciousness. The sub-conscious has been given direction by the conscious and continues the search for the name after the conscious processes have been turned elsewhere. Subconscious activity is much wider and has greater resources than the conscious. Many complex processes of which we have crude evidence are performed by it, such as the arrangement and use of an over-abundance of details of a problem, which could not be contained in the conscious mind. It has also been suggested that *genius* can be explained as the superior ability in setting sub-conscious processes to work and profiting by them. Plato regarded this as inspiration, and called it divine frenzy. Cicero termed it the 'furor poeticus.' For three years Goethe worked under almost continuous inspiration. Mozart in playing a game thought out the Aria of the Magic Flute. In a letter to a friend he attempts to describe how he developed his sonatas, but said that "I do not myself know or cannot find out, whence and how comes that which now inflames my soul." Great scientific discoveries, such as the theory of atomic grouping, have flashed themselves, in idle moments, into the minds of their inventors.

There is no explanation for such inspiration save that these ideas are the products of unconscious processes; or the fruition of inner preparatory experiences which had always been working towards this same goal.

Another phenomenon explainable by the existence of sub-conscious processes is *conversion*, either the religious, moral or intellectual. Conversion seems the result of unrecognized workings of the sub-conscious mind which are suddenly thrown into the conscious life by some external incident and a change takes place in the person. Conversion seems to take place only in persons whose conscious mind activities have set the sub-conscious working. Sub-conscious activities are set going, are limited and conditioned by the conscious mind and receive all their knowledge and experience through it. The intellectual conversion of Rousseau, his "dazzling and overwhelming flash of intuition" seemed a new revelation to him, but was only the result of hidden processes of thought.

Sub-conscious processes seems to be greatly involved in all *sense perception*. Perception is a complex process whereby sensations are interpreted by the mind. This process of interpretation takes place outside the consciousness and only the finished product rises to the consciousness. The inferential processes by which sensations are interpreted and wrought into perceptions, cannot be discovered and they must be part of the conscious mind.

Two arguments from the nature of mental processes favor the idea of the sub-conscious.

First—The laws of contiguity and similarity in the association of ideas. *If one idea is to recall another, it must have been contiguous or similar to it.* Often ideas not associated to each other follow. This can only be explained on the ground that the two conscious ideas, say "A" and "C" which follow each other, are related by one of these two laws of association to a third idea, "B", which lies in the sub-conscious. An example, is the case of Sir Wm. Hamilton who, seeing Ben Lomond, thought immediately of German education. Later he remembered that when he had visited Lomond before a German had been with him and had talked of the German system of education. The idea of the German and his talk had been working in the sub-conscious.

Second—The laws of attention. Stimulation of sense which have no conscious effect may be made conscious by directing the attention upon them. Sounds of the ticking of a clock must be present always in the mind though the greater part of the time one is unconscious of them. Attention can only discover what already exists in the mind and close attention to any part of our bodies brings out numerous sensations to which we were formerly unconscious. Mere attention could not reveal such sensations unless these were already present in the sub-conscious mind.

LECTURE IX. HYPNOTISM.

Hypnotism seems to prove existence of these mental states and processes of which we are not aware. It is destined to play as important a part in Psychology as it will in medicine, because it throws light on these sub-conscious processes.

History. It was known early to the Indian fakirs but was not studied until the time of Mesmer (1734-1814) of Vienna who termed it Animal Magnetism. He was something of a charlatan, so not until 1840 was it studied scientifically. Elliotson, a London physician, then began to mesmerize his patients and used it as a medicinal agent in cases of pain. Esdaile in 1845 used hypnotism as a surgical anæsthetic in a government hospital in India, with great success. The introduction of chloroform, however, has lessened its importance in this respect. In the hypnotic trance two types are distinguished

1. The *lethargic or anæsthetic*, in which the patient's sensibility is depressed and sleep or drowsiness ensues. This is the preliminary state to

2. the *alert or hyperanæsthetic* (increased anæsthetic) trance in which sensibility is increased and the subject keeps his eyes open. When a man has been hypnotized a number of times he can be induced into this state without passing through the preceding state.

The sole cause of hypnotism is in mental suggestion. Belief in the possibility of a trance, and willingness to yield are necessary conditions on the part of the patient to be acted on. 94% of people can be hypnotized but only 10% so completely that they could undergo surgical operation without pain. A man with sound and steady nerves is more easily hypnotized than the nervous high-strung man.

Post-hypnotic Suggestions. Experiments have been successfully tried of suggesting a certain action to a person in a trance, to be accomplished perhaps 20 days or a month after the trance. The sub-conscious mind forces the person to do that action when the time comes even if he does not realize why he is doing it.

There is (1) no continuity of memory between trance states and consciousness but (2) a chain of memory connects successive trance states.

Two phenomena—*automatonism* and *mediumship*—seem conclusive evidence of sub-conscious processes.

In the first a subject hypnotized may read and at the same time write. If by suggestion the patient's writing arm be rendered anæsthetic, the patient will have no knowledge of the movement of writing in that arm and so the content of the writing will be a surprise to him on awakening.

The "spiritualists" (used in the common meaning of the word) believe such writing to be inspired. Table turning is due to the same cause as this writing. The hypnotic subject has himself pushed on the table but as he has no sensations of touch he firmly believes that the table has been moved by "spirits."

Mediumship. In this the hypnotic subject usually utters rather than writes, what is considered as inspired, by some but what is really but the result of sub-conscious process of reasoning. This seems a plausible if not possible solution to the problem of communication with the spirit world and some eminent men, for example, Prof. Hyslop and Sir Oliver Lodge have adopted it. William James was at one time inclined to this theory, but later rejected it.

- I. THE SUBJECT-MATTER OF PSYCHOLOGY. BASED ON THORNDYKE'S "ELEMENTS OF PSYCHOLOGY," pp. 319-24, and JAMES "PSYCHOLOGY: BRIEFER COURSE," pp. 1-3.

The Science of Psychology as a whole covers the study of all sorts of mental life in all sorts of people and in animals. Besides the more general facts of ordinary human mental life, psychology deals with the psychology of children as well as adults; of animals of all degrees of intelligence; of the growth and decay of the mind; and studies of the deeper realities behind human lives as well as of mental facts taken at their face value.

The Subject-Matter of Psychology is as follows:

1. General Psychology—the ordinary mental life of human beings.
2. Individual Psychology—the nature and amount of mental differences found among human beings.
3. Abnormal Psychology—the exceptional and unhealthy mental traits.
4. Child Psychology—the mental life of children.
5. Animal Psychology—the mental life of animals.
6. Physiological Psychology—the relations between mental life and the conditions of the body, especially of the nervous system.
7. Social Psychology—the aspects of mental life which are connected with the influence of human beings on one another and the action of human beings in groups.
8. Educational Psychology—the aspects of mental life connected with the production of changes in human beings, especially by consciously directed human effort.
9. Philosophical Psychology—the fundamental realities behind the facts of mental life—the place of mental life in the universe as a whole. The growth of mental life in the individual and the race is often called Genetic Psychology.

Psychology is the "description and explanation of states of consciousness as such." It is a natural science, for it assumes a "material world." The data peculiar to psychology are (1) thoughts and feelings (transitory states of consciousness) and (2) the fact that these states can know other things. Mental facts and their physical surroundings are so closely related that for an adequate understanding of the former, a knowledge of the latter is necessary.

- II. THE PSYCHOLOGY OF THE NERVOUS SYSTEM. BASED ON THORNDYKE, pp. 120-62, WITH REFERENCES TO CHAPTERS VII, VIII, IX IN JAMES.

(For an understanding of the arrangement and structure of the nervous system and nerves study carefully the plates in the text between pages 122 and 160 of Thorndyke and the chapters in James.)

Gross Structure—The nervous system as a whole is divided into (1) The Central Nervous System including the brain and spinal cord. (2) The nerves passing from it to different parts of the body. (3) The sympathetic system and its isolated ganglia in different parts of the

body. (4) The nervous system apparatus of the end-organs such as the eyes and ears. See Fig. 2.

The brain is divided into the cerebrum, the cerebellum, and the medulla oblongata. The cortex of the brain is the gray matter composing its outside layer. See Figs. 3, 4.

Finer Structure. The units which make up the nervous system are *neurones*. These neurones are very fine thread-like structures, frayed out at their ends and at different places along their course, and sending out branches. The optic nerve, for example, is a bundle of these neurones placed side by side like the wires in a submarine cable. All the nerves are made up of neurones.

The structure of the brain consists of millions of neurones running in different directions. Each neurone is a definite unit. See Figs. 6, 8, 9, 10, 11, 12, 13, 14, 15, 16. The nervous system is the sum of all its neurones.

Structure of Neurones—At irregular intervals along the neurones are thickenings of the thread which contain the nucleus and are called cell-bodies.

The process or part which goes out of the cell body for a considerable distance slowly diminishing in size and giving out branches till it frays out at its end, is called an *axis-cylinder process*, *neuraxon* or *axone*. These convey out impulses.

The processes which go only a short way from the cell-body rapidly diminishing in size and branch again and again like a tree are called dendrites. The fine processes given off by the axone or neurone are called collaterals.

The branching out at the end of any part of a neurone is called terminal arborization. Study Figs. 17, 18, 19, 20, 21, 22, 23.

Axones are covered by a substance called the medullary sheath throughout part of their course. Neurones outside the central nervous system have a second covering called the Sheath of Schwann. See Figs. 24, 25.

Neurones vary in size from less than a twentieth of an inch to three feet in length.

Neurones are not in actual physical contact with each other but connection is made in some way not known. They are of 3 classes. (Important) :

1. sensory or afferent, which start in sense organ and terminate in brain centre.

2. motor or efferent, which convey impulses from brain centre to muscles.

3. Associative, which secure proper connection between the stimulus and the action of the body. These are the most important.

The function of the nervous system is to bring every part of the body into harmonious co-operation with every other part. (Important.)

Each region of the cerebral cortex (the whole brain) responds to the stimulation which its afferent fibres bring into it, in a manner with which a peculiar quality of feeling seems invariably to go. *This is the Localization of Functions.* The left side of the brain controls the right side of the body. Certain facts, however, seem to oppose this. A man had a crowbar driven through his brain but he recovered later with but a slight attack of paralysis. The lobe of a brain of a certain man upon death, was found to contain nothing serous fluid; the other lobe seeming to have assumed the function of both.

Aphemia, or motor-aphasia, is a disease in which the patient retains his voice but is unable to utter words. When a patient in this condition dies, one of the ~~convulsions~~ ^{convulsions} of the brain is always found to be injured and this is one of the most instructive proofs or evidences of motor localization in the cortex.

Auditory aphasia is the inability to understand words, when heard. The centres of Vision and Hearing are definitely located; those of smell, taste, and touch are not so definite. Laws of Brain Action:—

1. *Law of Expression.* (Important.) Every stimulus in sensory neurone has its result somehow and some where.

2. *Law of Inhibitory Action.* (Important.) When the result of nervous action is apparently negative, checking or restraining, this state of affairs is called inhibition. (Example of inhibition—we die when the vagus nerve to the heart is cut, not because heart stops beating but because there is no inhibition to keep it from beating too fast.

3. *The functions of the cerebral hemisphere and their relation to the lower nerve centres.* (Very important.) The cerebral hemispheres are the two divisions of the cerebrum. The functions of the cerebral hemispheres are

1. *Cognitive.* They are the seat of memory and of general intelligence.

2. *Controlling.* Regulates action of lower nerve centres in which all reflex action takes place.

Their relation to the lower nerve centres may be compared to a general giving orders to his subordinates who must think out means to the end. The hemispheres are the sole seat of consciousness and although they send the message they can not perform the action themselves but leave this to the lower centres.

Pure reflex action is action which takes place, without the action of the brain centres. (Example—winking the eye when an object approaches.) It always takes place through the collaterals. The *reflex arc* is a simple circuit of a shorter or longer series of neurones from sensitive surfaces to organs of response. The stimulus does not pass through the brain centres for the action is automatic.

Relation of reflex action to bodily dexterities. (Important.) Long practice has enabled the muscles used in piano playing, baseball, etc., to respond by aid of the reflex arc to sensations without brain action.

III. THE PSYCHOLOGY OF THE SENSE ORGANS. BASED ON JAMES III, IV, V; THORNDYKE, pp. 154-157.

There are three divisions of senses—Organic, Special, and Motor. The organic senses are indefinite and vague. We seem ignorant of their presence, but they are of great importance in forming the general temperament of an individual. Examples are the visceral sensations, respiratory sensations and feelings of bodily comfort or discomfort in general. Their most marked characteristic is their tone value, the high degree of pleasure or pain which they contain. They are the indications of organic health or disease.

The Special senses are five in number, and in the order of increasing sensitiveness are as follows: Taste, Smell, Touch, Hearing and Sight.

All of these senses are not elemental but *complex*, containing other senses. Thus in the ear, the semi-circular canals govern sense of bodily equilibrium. With Touch, a temperature sense is involved.

Sense organs vary from simple afferent neurones which forward the stimuli they receive to the brain centre or nervous ganglia, to complex organs such as the eye, containing thousands of neurones.

1. *Taste*.—Taste is a chemical process as opposed to a mechanical process as in touch or hearing. To receive impressions of taste the back part of the tongue is coated with minute cone-like protuberances, called taste bulbs. These register but four *real* "*tastes*"—sweet, sour, salty, bitter. These are caused by stimulation of the olfactory nerve endings of the nose as well as mere contact of the substances with the tongue.

2. *Smell*.—Smelling is a chemical process which transmits stimuli to the brain, from the membrane in the upper part of the nostrils. To produce sensation, a stream of air with, a gaseous condition of heat and moisture, is necessary. In animals smells are classified as interesting or uninteresting and not as pleasurable or painful, etc.

3. *Touch*. This is the pressure sense and it is both a mechanical and chemical process. Sensation is transmitted from the skin and the fine hairs on this surface transmit with increased force impressions they receive to the nerve fibres at their ends. There are three kinds of sensations received from the skin—touch; heat and cold; pain, or more properly smarting. The delicacy of the tactile sense varies but is greatest on forehead and back of the forearm. The second class are measured by Temperature Spots, which are acutely sensible to feeling heat and cold. One spot registering heat; another cold only.

The power of determining the exact spot on the skin at which the impression is received, is called the localizing power. It is greatest on the tongue tip and least in the middle of the back.

The acuteness of the temperature sense is greatest at about 86° F. where differences in one-fifth of a degree are easily noted.

4. *Hearing*.—(Technical terms and description are unimportant.) Hearing is developed from contact of sound waves and hence is purely a mechanical process.

The Ear consists of three portions:

1. The external ear or concha and the auditory passage.
2. The middle ear or tympanum, an irregular cavity in the temporal bone which is closed on the outside by the drum membrane. From the inside the Eustachian tube proceeds and opens into the throat, to equalize the pressure on the ear drum.
3. The internal ear or labyrinth. Consists primarily of chambers and tubes hollowed out in the temporal bone. It consists in the vestibule, the three semicircular canals (which govern the sense of bodily equilibrium, having nothing to do with hearing) and the cochlea. Farther in are short hair cells which are the terminal organs for picking up the vibrations.

Sound consists in vibrations, hence our hearing is from sensations set up by friction. *Noise* is the result when the waves are not periodic; a *note*, or *tone*, when they are periodic. *Loudness* depends on the force of the waves; *Pitch* on the number of waves (the frequency) that break upon the ear per second. *Timbre* or musical 'color' is due to the wave form. The quality of the same tone differs on various instruments on account of the fact that a tone is always fused with its overtone. The discriminative sensibility of the ear is great since in the neighborhood of 1000 vibrations, one-fifth of a vibration more or less can make the sound seem sharp or flat. Two or more complete vibrations of the same size must occur to give tone sensation, otherwise the sensation is noise. There are 550 different qualitative noises.

5. *Sight*.—Vision is the result of a chemical process. The eye is the organ of sight. (See page 30, James.) It is a slightly flattened sphere formed by the *scelerotic* membrane (which is white and tough) enclosing a nervous surface, a *lens* and certain refractory media, through which the light after being bent, travels until it strikes the *retina*. This is the inner coating of the eye and corresponds to the sensitive plate or film in the camera. The retina consists of rods and cones; the former extending the whole length (1-350 of an inch) of the layer of the retina, while the cones are shorter. These end organs point backwards to the scelerotic membrane and not directly toward the light.

The *blind spot*, is the place at which the optic nerve enters the eye through the retina and other coats. As there are no rods or cones here, the light waves make no impression. The existence of this spot which is very small in the eye is easily proven.

The *fovea* is a little pit, or yellow spot, at which point there are only cones. These come in direct contact with the light waves and here the retina is most sensitive. The eye balls are rotated and the lens adjusted so that the image may fall upon this point.

Accommodation is the focussing or adaptation of the eye for near or far distant objects. This is done by means of a pair of *ciliary muscles* (Important) *which are purely reflex, governing the curvature of the lens*. The contraction of this muscle renders the lens more convex, to bring into sight near objects. The relaxation flattens the lens, to adapt the eye for distant vision.

Convergence is the turning of the eyeballs. With it and accommodation the *pupil* of eye is contracted or expanded to allow less or more light to enter.

The Visual Process is purely a chemical process in the outer layers of the eye. The light after being refracted through the lens and 'humours' acts upon the rods and cones of the retina in such a way as to start a current in the *optic nerve*, to the brain centre, in somewhat the same manner as an electric current. There is no image in the brain which is in any respect a copy of the image on the retina. It is the sensations which are produced by sensations in the brain that constitute the "stuff" of our visual sensations.

Binocular Vision. In this, the two eyes act as independent spectators, viewing the world from different standpoints, the information supplied by each eye being combined by the mind into a complete mental image. By this we get *Vision of Solidity* and also *Perception of Distance*, which will be discussed at length in the lectures later.

Color.—The white color sensation is apparently simple but is complex, being divisible into seven primary colors. The rods in the retina are exhausted or fatigued by daylight, but are used for receiving impressions of dim light. The cones are affected by stronger light only. The rods have only the sensation of bluish gray color which may vary in intensity only in narrow limits. Cones receive all 7 colors and their shades.

Color blindness, of which inability to see red is the greatest, is found in about 4 % of the population.

Complimentary colors are those pairs of colors which, when they impress the retina together, produce white. Examples:—spectral red and green-blue; yellow and indigo-blue.

The Duration of Light Sensation. Since the retinal process is longer than the duration of the stimulus there result the so-called after images which we can see ~~with our eyes shut~~. There are three kinds:

1) primary positive after-images, such as are seen in the sensation of light in the trail of a skyrocket or comet, after the stimulus which caused that sensation has gone out.

2) negative after-images—which are due probably to the fatigue of the retina, resulting in a vision of the object, (which has been steadily observed for some time previously) in the complementary color to its correct color. ~~With the eyes still closed this negative after-image will finally be replaced by the~~

3) secondary positive after-images. These are the reconstruction or recurring of the primary positive after-images, and they resemble it in most respects.

The third division of senses contains the Motor Sense in which there are three divisions. This sense will be more fully described later in the lectures. Muscular sensations, and sensations from the joints and tendons come from it. The muscular sensation is felt in lifting, pushing, straining, etc. We are able to determine the position of points in our body by means of the joint sensations. By means of the tendon sensation, the amount of resistance or strain for some action can be determined.

IV. SENSATION AND PERCEPTION.

I. SENSATION BASED ON CHAPTER II (JAMES) AND CHAPTERS II (THORNDYKE).

Sensations are feelings of qualities or conditions either of things or one's own body. Pure sensations are such feelings when uninfluenced by previous experiences and are possible only in early infancy. Elementary sensations are feelings so simple as to be unanalyzable or unresolvable into simple ones. Elementary sensations are really abstractions invented to aid us in our understanding of mental life.

Sensations have four *attributes*—(1) Duration—they all last a certain time; (2) intensity—they have a certain amount of themselves which ought to be conceived as greater or less; (3) bigness or extensity, and (4) quality of which color, pitch, sweetness are examples.

Sensations and Stimulus: The stimulus to a sensation is the physical cause of activity in a sense-organ. The *threshold of sensibility* is the weakest stimulus which will cause a sensation. The Range of Sensibility is the range of physical stimuli below and above which a sensation can not be produced. Sound ranges from 16 vibrations to 30,000 per second.

The "*Law of Threshold*" is that a certain amount of outward stimulus is required to produce a sensation.

Weber's Law. (Important.) *Intensity of sensation increases by slower steps than by those by which its exciting cause increases.*

The *acme* is reached when no increase in stimulus makes an increase in sensation.

The Law of Relativity. (Important.) Each sensation is determined in existence, intensity, and quality, by its relation in which it stands to other sensations coexisting with it in conscious action.

The law of specific energies of the brain. (Important.) The fact that particular parts of the brain are affected by different nerves or by stimulating a certain portion, we get only sensations peculiar to that part. *The same stimulus to different nerves result in different sensations; different stimuli to the same nerve result in the same sensation.*

Sensations are to be distinguished from perceptions. Sensations come before perceptions. Sensation's function is mere acquaintance with a fact; perception's function is to know something about that fact. Objects merely thought of or imagined are fainter than sensations and perceptions and lack the quality of real presence which the objects of the last two named possess.

Through sensation we get no *apprehension* of shape or definite size.

The qualities of the material thing *impress* our senses but by combination with the recollection of past experiences we *perceive* the object.

11. PERCEPTION—BASED ON CHAPTER XX (JAMES), THORNDYKE, pp. 35-41.

Perception is the ideal condition whereby an individual interprets the given sensation in and through itself by past experiences. It is the consciousness of particular material things present to sense.

Illusions. The so-called fallacy of the senses is not a fallacy of the senses proper but rather of the intellect which interprets them wrongly. *Illusions are of two kinds.* (Important.) The wrong object is perceived because

1. the habitual or probable cause is taken as the real cause. Example—the moving railway train, etc. Read pp. 318-20 (James).

2. Our mind is temporarily full of the thought of the true object. Example—A person expecting to see a ghost on a dark night will likely not be disappointed. For other examples, read James, 318-325.

Hallucination, subjectively considered, is a sensation as good and true as if there were a real object as its cause, yet the object is not present. (Important.)

It is usually (but wrongly) thought that they differ from illusions in that they have absolutely no objective stimulus at all, while illusions have some objective stimulus which is misinterpreted. *Hallucinations are extremes in the perceptive process.*

Pseudo Hallucinations are the milder degrees of hallucination. They seem to come without any activity in producing them; and they lack *the character of objective reality*. That is we see immediately that they are false, while hallucinations appear to be true.

The distinction between Illusion, Hallucination and Pseudo-Hallucination is not definite.

V. THE STREAM OF CONSCIOUSNESS AND THE SELF.

BASED ON JAMES XI, XII, AND THORNDYKE, pp. 92-96.

1. THE STREAM OF CONSCIOUSNESS.

Our life is not a series of isolated sensations, memories, etc., but all combine to form a stream of consciousness. There are 4 characteristics of consciousness:

1. It is *personalized*. No one can have another's mental state. Each definite mental state belongs to one person and to one only.

2. It is constantly *changing*. No state once gone can recur and be exactly the same as it was before, for each mental state recurring varies with the mood of the mind.

3. It is sensibly *continuous*. There may be time gaps where consciousness seems to stop and starts again (sleep), but the mind bridges it over.

The changes from one moment to another in the quality of consciousness are never absolutely abrupt. A loud explosion or a peal of thunder does not rend the consciousness in twain because even in our listening to the thunder we are aware of the previous silence, on account of the great contrast which it makes with the sound.

4. It is *focalized*. It is always more interested in one part than another. Our attention in a field of objects may be compared to four concentric circles; each greater than the former. The smaller represents the focus of our attention. The second represents objects which are more or less apprehended. The third contains the objects which impress us but vaguely and the fourth shades off into unconsciousness.

II. THE SELF.

The Self as Known—In the widest possible sense, a man's *empirical self* (Important) or *me* is the sum total of all that he can call his. (2) *The Constituents of the ME*:

(a) The Material Me. This includes the body, the clothes, our immediate family, our home, our property. (b) The Social Me: This is the recognition a man gets from his mates. Properly speaking, a man has as many social selves as there are individuals who recognize him, and carry an image of him in their mind. (c) The Spiritual Me: This is the entire collection of states of consciousness, rather than any one of passing states of consciousness.

(2) *The Feelings and Emotions of Self*: These are of two sorts—self-complacency and self-dissatisfaction. (3) *The Acts to which they prompt*—These are self-seeking; bodily, social or spiritual.

A tolerably unanimous opinion ranges the different selves in an order with the bodily ME at the bottom, the spiritual Me at the top, and the various other selves between. In each kind of Me, men distinguish between the immediate and actual, and the remote and possible. Thus men forego a present advantage for the sake of future gain.

There is a rivalry and conflict of the various selves. We would wish to be different individuals at once—an impossibility. There are no rational grounds for self-esteem. We may make the ratio of self-esteem equal success divided by pretensions. If we diminish the denominator of this fraction (pretensions) we eliminate the causes of unhappiness.

VI. HABIT. JAMES, CHAPTER X.

Habits are tendencies to respond which are created in whole or in part by experience, practice or training.

An acquired *habit*, from the physiological point of view (Important) is nothing but a new pathway of discharge formed in the brain, by which certain incoming currents ever after tend to escape. The physical basis of habit in living beings is the plasticity of the organic materials of which their bodies are composed.

The Practical Effects of Habit. (Important.) (1) Habit simplifies our movements, makes them accurate and diminishes fatigue. (2) Habit diminishes the conscious attention with which our acts are performed. In habitual action, the only impulse which the intellectual centres need send down is that which carries the command to start. In fact, habit depends on sensations not attended to, e. g., Knitting appears altogether mechanical, and the knitter keeps up her knitting even while she reads or is engaged in lively talk.

Habit is a second nature. *Its moral value is great for it is the most precious conservative agent of society.* The period between twenty and thirty is probably the critical one in the formation of intellectual and professional habits; the period below twenty is even more important for the fixing of personal habits, such as pronunciation, gesture, motion, dress, etc.

In forming new habits: (1) begin with as strong and decided an initiative as possible, i. e., accumulate all the possible circumstances which shall re-enforce the right motives. (2) Never suffer an exception to occur till the new habit is securely rooted in your life. Abrupt breaking off, rather than "tapering off" of an old habit such as drinking, is the best way if there be a real possibility of carrying it out. (3) Seize the very first possible opportunity to act on every resolution you make, and on every emotional prompting you may experience in the direction of habits you desire to gain.

VII. MEMORY. JAMES XVIII, THORNDYKE, pp. 255-260, pp. 50-52.

Memory is the knowledge of an event or fact, of which meantime we have been thinking, with the additional consciousness that we have thought or experienced it before. It may be defined as a "mental revival of conscious experience." Not only is an image of fact necessary for memory but the fact imaged must be thought of as in "my" past. In this respect memories are judgments concerning one's past experiences. Memory in the broader sense involves (Important) (1) the *retention* of the remembered fact. (2) The *reproduction* or recall of that fact. In the narrower sense it involves (1) retention; (2) reproduction; (3) recognition; (4) localization in the past.

The laws of Association explain both these conditions, when the paths travelled in the process of association are slumbering, they are the condition of retention; when active, of recall.

Memory (Important). Since memory is altogether conditioned on brain paths, its excellence in a given individual will depend partly on

the number and partly on the persistence of these paths. This persistence or tenacity differs enormously from infancy to old age and from one person to another. Moreover, the more other facts a fact is associated with in the mind, the better possession of it our memory retains. The one who thinks over his experiences most and weaves them into systematic relations with each other, will be the one with the best memory.

Improving the Memory (Important). One's native retentiveness is unchangeable. All improvements of the memory lie along the line of *elaborating the associates* (connections) of each of the several things to be remembered. This may be accomplished by the improvement of one's habitual methods of recording facts.

"*Mechanical*" methods consist in the intensification, prolongation, and repetition of the impression to be remembered; "*judicious*" methods are logical ways of conceiving things. (Example—arraying things in classes. All sciences are such methods); *ingenious* methods are special mnemonic schemes.

Forgetting is as important a function in the use of our intellect as remembering. If we remembered everything, we would never get ahead with our thinking.

Recognition is the retention of the image, with failure in reproducing it with facility. We are conscious of the presence of some past experience but are unable to call it up immediately.

Hypnotic subjects, or patients under anæsthetics are unable to recall events while under that treatment. While in a trance, subjects can recall events which happened to them in previous trances. The same is true in cases of dual personalities.

Appropriate Revival means what really counts in memory is not the mere ability to weave a mental fact, *but* to revive it at its proper situation. A good memory depends upon (1) the permanence of the impressions, (2) the permanence of connections or associations, (3) their number, and (4) their arrangement.

Individual Differences: No two people have the same power of remembering. This difference is due (1) to differences in capacity to retain impressions and connections; (2) differences in interest, and (3) differences in the training of the capacity. To have one fact call upon another, practice and training is necessary. The intellect needs to be taught to make associations of mental facts.

VIII. IMAGINATION. JAMES, CHAPTER XIX, AND THORNDYKE, pp. 43-50.

Sensations, once experienced modify the nervous organism so that copies of them arise again in the mind, after the original outward stimulus is gone. Experiments show that men differ (Important) in their visual imagination. So, too, images of sounds, of muscular sen-

sations, and of touch, differ with different individuals. Those who think by preference in auditory images are called "*audiles*." Such persons imagine what they think of in the language of sound. In order to remember a lesson, they impress upon their mind, not the look of the page, but the sound of the words. Those who think in terms of muscular sensations are "*motiles*"; in terms of touch "*tactiles*."

Mental Images are feelings of things, qualities and conditions of all sorts. As not present the most frequent images are of sights, sounds, movements. The most important group of images are those of each of the five senses plus images of feelings of movement.

Generic Images are mental images which possess only the commonest features of a class of objects being incomplete and hazy and changing in all minor details. Generic images are like composite photographs.

Images differ very greatly in clearness, in fidelity, and control in different persons, and different images in the same person. (Read examples of different images on pp. 46, 47, 48, Thorndyke.)

The image is never the exact duplicate of its corresponding percept, or sensation: If it were, one would feel the object as really present. In childhood images seem real, but later we acquire the ability of discrimination between image and percept.

Reproductive images are of whole things which have been experienced such as of a horse. *Productive images* are those of things never experienced but made up on a basis of old elements and parts, as the imagining of a horse with a lion's head.

Imagination and Memory.—The main difference is a sort of belief in reality. We *remember* what we knew really existed; what we *imagine* we somehow exempt from any obligation of reality. Imagination can deal with what may happen, is happening, etc., for it is not bound as is memory to the past.

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